State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

GUIDE LEAFLET

GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA

PORT BYRON AREA

Rock Island County

Port Byron, Cordova, and Erie Quadrangles

Leaders
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Urbana, Illinois
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GUIDE LEAFLET 1955D

Port Byron Geological Science Field Trip

ITINERARY

0.0 0.0 Port Byron High School. Assemble in Parking Area behind the school. Approach the road sign and stop before entering Route 80. Turn left (south).

0.5 0.5 Note the abandoned quarries in Silurian rocks on right and left.

0.6 1.1 Slow.

0.1 1.2 Turn left (east) on T-road. Note that the top of bedrock is at about 600 feet above sea-level. Keep this elevation in mind.

0.2 1.4 Bear left.

0.9 2.3 Note the dissected loess surface on the upland.

0.2 2.5 STOP 1. Soil profile in ravine.

The glacial history of the Port Byron area is complicated. We find glacial drift, loess, glacial silts, sand dunes, gravel, and gumbotil. At least three times glacial lakes occupied the area during the last stage of glaciation, the Wisconsinan. Many factors influenced the development of the topography and the drainage system.

In preglacial times, the ancestral Mississippi followed the present Mississippi channel to the vicinity of Cordova where it turned southeast and flowed to the "Big Bend" near Hennepin on the present Illinois River. The bedrock hills and valleys, developed by flowing streams, formed the topography at the beginning of the Ice Age.

The glaciers that covered Illinois and the northern part of the North America spread out from various centers in Canada, chiefly east-central and eastern Canada, at different times during the periods of glaciation.

Glaciers accumulate when the mean average temperature is so low that the winter snows do not all melt during the following summer, and the accumulation goes on for hundreds, perhaps thousands, of years. The weight of the ice mass finally makes it flow outward. We have evidence that glaciers advanced as far south as the Missouri and Ohio rivers and south of Carbondale and Harrisburg in Illinois.

The principal stages of glaciation are named Nebraskan, Kansan, Illinoian, and Wisconsinan. Between the glacial stages were warmer interglacial stages at which times soils and profiles of weathering developed on the deposits of earth materials left by the glacier.

When, for some reason, mean annual temperatures rose, the glacial ice began to melt and thus halted the advance of the glacier. The earth material that had been picked up and frozen into the advancing ice was then dropped. Where it is an unsorted mixture of clay (rock flour), pebbles, or boulders, it is called till.

The melt water pouring out from the ice carried with it much of the finer material such as sand, silt, and pebbles. The water-sorted material is called outwash. The coarser outwash material was deposited near the ice front, the finer materials further away. Where

the outwash material was dropped widely as a sort of apron in front of the ice it is called an outwash plain; where it was dropped in valleys which drained away from the melting ice it is called a valley-train.

Geologists think that during the winters the melt waters subsided so that the outwash plains and valley-trains were exposed to the wind. The wind picked up silt and fine sand, blew it across the country, and dropped it to form deposits of loess. A covering of loess is found almost everywhere in Illinois, much thicker near the large valleys. In some places near the old stream valleys the loess is as much as 20 feet thick.

The Port Byron area has glacial deposits from the Kansan, Illinoian, and Wisconsinan glacial stages. The Kansan till is found only in isolated areas and we will not see it on this trip, but we will see both Illinoian and Wisconsinan deposits. During the Illinoian and Wisconsinan stages of glaciation, the ancestral Mississippi River, flowing southeast across northwestern Illinois, was blocked by ice and the diverted river was forced to cut other channels.

Stop 1 is on the dissected loess-covered upland. In this valley the outlet was blocked and silt was deposited. Later a rich mucky soil developed on the silt. Still later the valley was blocked again so that another layer of silt was deposited on top of the soil. At the same time wind-blown loess was being deposited on the hills along the edge of the valley.

The section you see here is as follows:

	Thickness Ft.	In.
Upper Profile in the edge of the valley:		
Soil, gray, loessial		8
Loess, clayey, weathered, non-calcareous, brown-tan	2	
Covered interval		
Lower Profile		
Silt, fine grained, laminated, with inclusions of peat and carbonized twigs	3	
Soil, black, carbonaceous, mucky	2	
Silt, dark gray, carbonaceous, clayey, fairly micaceous		10
Silt, finely micaceous, gray with brown iron-stains	3	

2.4 4.9 Continue east on upland.

0.2 5.1 Descending a tributary of Zuma Creek.

0.4 5.5 STOP 2. Road cut.

Section along road cut.

	Thickness Ft.	In.
Peoria		
Loess, largely grass-covered	15	
Soil, carbonaceous, dark gray, very clayey . . .	2	6

Illinoian	Thickness Ft.	In.
Till, brown, weathered, leached, non-calcareous . .		6
Till, reddish-brown, pebbly, slightly calcareous .	1	

Bottom of ditch.

0.2 5.7 Note pebbly till along the road ditches. The cut on the right side of the road is capped by 25 feet of buff loess.
Here you have a view across a valley tributary to the ancestral Mississippi River. It flowed northeast and emptied into the ancestral river just east of the middle of the wide valley.

0.2 5.9 STOP. Turn right (southwest) on Route 2.
You are now driving along the north edge of the old valley; the south edge of the island upland is on your right.

0.7 6.6 Caution! Intersection with Route 92. Turn left (south) on gravel road.

0.8 7.4 Turn left into quarry yard and turn around so that cars are headed out and along roadway.

STOP 3. Soil Profile and Midway Quarry.

CAUTION - DO NOT CLIMB ON THE WALLS OF THE QUARRY.

We are now in the preglacial valley which drained the south side of the Cordova rock "island" and the area as far south as Andalusia. The water flowed northeastward and emptied into the ancestral Mississippi just to the northeast. At a later time the Mississippi flowed southwest into this valley.

The soil profile in this valley is not clearly understood because the valley has had such a varied history. The section is as follows:

Recent	Thickness Ft.	In.
Soil, surficial, black, mucky, friable, with igneous and metamorphic pebbles	1	3
(?)		
Till, black, carbonaceous, clayey and pebbly . . .		10
Till, as above, also containing many dolomite pebbles		8
Till, reddish-brown, clayey, gravelly, probably occurs only in pockets in the top of the bedrock.		6
Silurian-Port Byron formation		
Dolomite, ranging from dense and fine to coarsely crystalline, contains numerous fossil casts and molds. Beds inclined from 5 to 35 degrees, owing to effect of being draped over the surface of a coral reef. There are interbedded shales at various zones. The core of the reef has been quarried away.		

Such coral reefs as this, buried deep in the earth, have been found to contain petroleum in the western portion of the Illinois oil fields. The Tilden oil pool near Sparta, Illinois, is an example of an oil pool in such an old coral reef. As a matter of fact, even in the Chicago area the Silurian rock is oil-stained and contains residual asphalt.

In the dolomite you will find such fossils as corals, crinoids (sea lilies), gastropods (snails), pelecypods (clams), cephalopods, and brachiopods. Fossils are abundant, but STAY OFF THE QUARRY WALLS.

0.8 8.2 Return to Highways 2 and 92. STOP! Turn left (west).

0.6 8.8 Turn right (northwest) on gravel road.

4.1 12.9 Turn right (north) on Route 80.

1.3 14.2 Turn right (west) at corner opposite the Standard Oil station.

0.2 14.4 Enter Dorrance Park.

STOP 4 - LUNCH. After lunch, assemble for discussion of the glacial history of the region.

0.2 14.6 Proceed to Stop Sign on north edge of Dorrance Park. Turn left (west) on pavement.

1.2 15.9 We are passing through the Narrows or the Cordova Gorge along this road. During the Sangamonian interglacial stage and the Iowan substage, small streams drained the Cordova rock "island." During Woodfordian (Shelbyville) time, glacial Lake Cordova occupied the area; its outlet waters breached the small divide at an elevation of about 640 feet and then cut the gorge or "narrows" that we see.

1.9 17.8 Continue on Route 80 following the "narrows."

0.3 18.1 Turn left (west) on gravel road. Caution - R.R. crossing. Turn around and park.

STOP 5. Discussion of the development of the Cordova Gorge and visit to the Collinson quarry. The quarry is in the Racine formation of Silurian age. The rock is poorly stratified here because it is in a series of small reefs or bioherms. Like the Port Byron formation which we saw this morning, the Racine is quite fossiliferous.

0.3 18.4 Return to Route 80. Stop. Proceed across the road, pull well off the highway.

0.1 18.5 STOP 6.

Here we see a section as follows:

	Thickness Ft.	In.
Soil, gray, sandy	1	
Silt, hard, clayey	4	
Sand, gray, fine		0-6
Silt, reddish-brown, in irregular lenses, with inclusions of tan silt	2	
Sand		

Since the sediments here occur below the elevation of 640 feet, it is obvious they were deposited after the Cordova Gorge was cut, because they would have been washed away during the cutting of the gorge if they had been deposited previously. The sediments are cross-bedded and are

inclined in a northwesterly direction.
Pull onto road cautiously. Continue north on Highway 80

1.4 19.9 We are now at the north edge of the "island upland," as well as at the north end of the Cordova Gorge. The terrain here has an average elevation of 600 feet. In the broad valley to the north the ancestral Mississippi River was joined by the ancestor of Wapsipinicon River which flowed from the west. (See diagram).

0.2 20.1 Turn right (east) on blacktop road at the Standard Oil filling station. Note on the right the abandoned kilns where Silurian dolomite was once burned to make lime. Eastward the limestone crops out at an elevation of slightly more than 600 feet. This rock ledge forms the south valley wall of the ancestral Mississippi River which at some time in the past was cut as much as 300 feet below the present surface but was later filled with glacial materials.

1.9 22.0 Road turns right (south).

0.4 22.4 Note the sand dune area on the left; it covers about three-fourths of a square mile.

0.2 22.6 Road turns left (east).

0.6 23.2 On right, note the isolated outcrop of limestone at the boundary of the island upland.

2.6 25.8 Along this road we descend to a lower level terrace which has an average elevation of 580 feet, an elevation only a little above the level of the river near Cordova.
Turn around at T-road north.

0.2 26.0 Road bends left. View ahead shows the edge of the 600-foot terrace.

0.8 26.8 Turn left (south) at T-road.

0.4 27.2 We are climbing the north boundary of the island upland. The rock terrace merges with the lower part of the island upland.

STOP 7.

The general upland surface is at an elevation of approximately 650 feet and is characterized by hills alligned northwest-southeast, indicating that glacial melt waters of Shelbyville age passed over the area. Sand dunes cap some of the higher hills in the area.

The section at the north end of the cut is as follows:

	Thickness Ft.	In.
Soil, weathered, gray, noncalcareous		10
Loess, oxidized, leached, brown, grades down to	1	2
Loess, noncalcareous	2	
Silt, tan to brown, noncalcareous	1	
Loess, pinkish	5	
Loess, tan to brown, with plant stems (?)	1	6

At the south end of the cut, two gray soils are developed at or near the surface.

0.3 27.5 Note on the left the elongate ridge which trends northwest-southeast. The upper portion of the ridge is sand.

0.7 28.2 Fine sand is exposed in banks of cut. In the last 0.3 mile we have crossed from an area covered with Wisconsinan glacial deposits onto an area covered with Illinoian glacial deposits, each having characteristic topographic expression and different mean elevations.

STOP 8. The cut, here entirely in loess, is as follows:

	Thickness Ft.	In.
Soil, gray, loessial		8
Loess, brown, weathered	2	
Loess, brown, with nodules	6	
Loess, gray, leached, oxidized	18	

The loess mantle seems thicker here than at the last cut. The loess was laid down over an irregular surface, and headward erosion of the streams further dissected the surface.

1.5 29.9 Turn right (west) on gravel road.

1.4 31.3 Turn left (south).

0 5 31.8 STOP 9. On the upland surface the section is as follows:

	Thickness Ft.	In.
Soil, gray, loessial	1	6
Loess, weathered, brown, non-calcareous	1	6
Loess, brown, weathered, with "ferreto" zone	2	
Loess, plastic, with iron stain	2	
Sand, brown, medium to fine-grained	4	

0.5 32.3 Stop for paved road.
Turn right to return to Port Byron
or
Turn left to go to Hillsdale and Route 2

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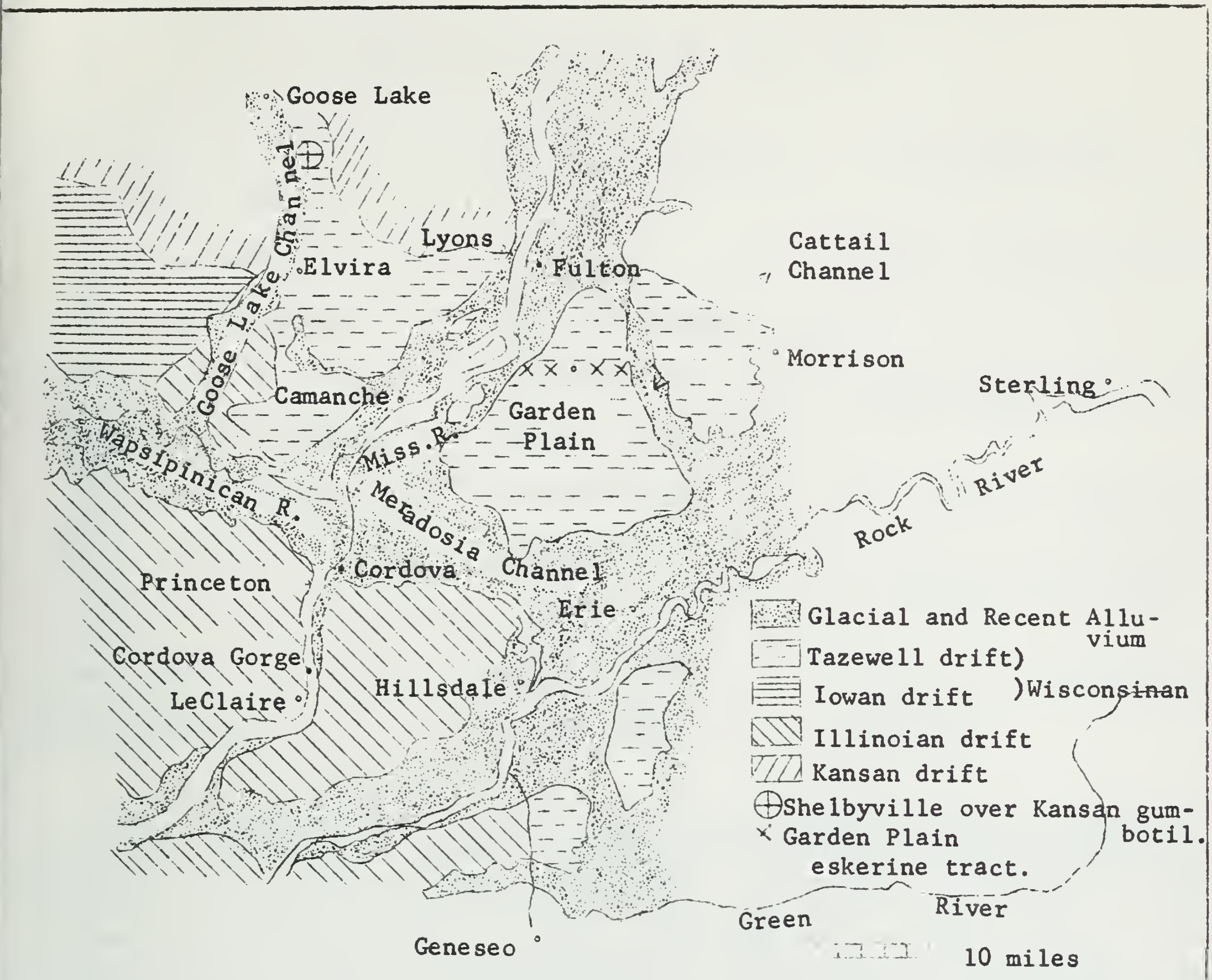


Glacial geology of the Port Byron area, from Illinois Geol. Survey Rept. Inv. No. 174, by Paul Shaffer.

The entire area was covered first by the Kansan and then the Illinoian glaciers. After each glaciation the Mississippi River and its principal tributaries, Wapsipinicon and Pleasant rivers, regained their courses.

When the Shelbyville glacier of the Tazewell substage of Wisconsinan age advanced from the east, it blocked the streams and created Lake Milan, which had its outlet westward and southward from Andalusia. When the Shelbyville glacier reached Hillsdale, it raised the lake level in the Mississippii and Wapsipinicon valleys until the water escaped over a côl in what is now the Cordova Gorge, cutting the valley deeper and deeper.

When the Shelbyville glacier reached its maximum advance, the lake in the upper Mississippi valley was raised still higher, and its waters escaped in a round-about route westward through Maquoketa valley, south through Goose Lake Channel, and east along the ice front to the Cordova Gorge. When the Shelbyville glacier melted, the Mississippi River followed a new course through the Cordova Gorge and Andalusia outlet.

GLACIAL STAGES IN THE PORT BYRON AREA

NORTH AMERICA	DIRECTION OF APPROACH	PORT BYRON AREA
Wisconsinan Stage		
Valderan Substage		Closest - Central Wisconsin
Two Creekan Substage	Period of Retreat	
Woodfordian Substage	From East & Northeast	Crossed Mississippi River near Cordova
Farmdalian Substage	Period of Retreat	
Altonian Substage	From Northeast	Mt. Carroll - Sterling area
Illinoian Stage	From East	Reached Mississippi River at Albany and crossed above Cordova
Kansan Stage	From Northwest	Passed over entire area
Nebraskan Stage	From Northwest	Unknown

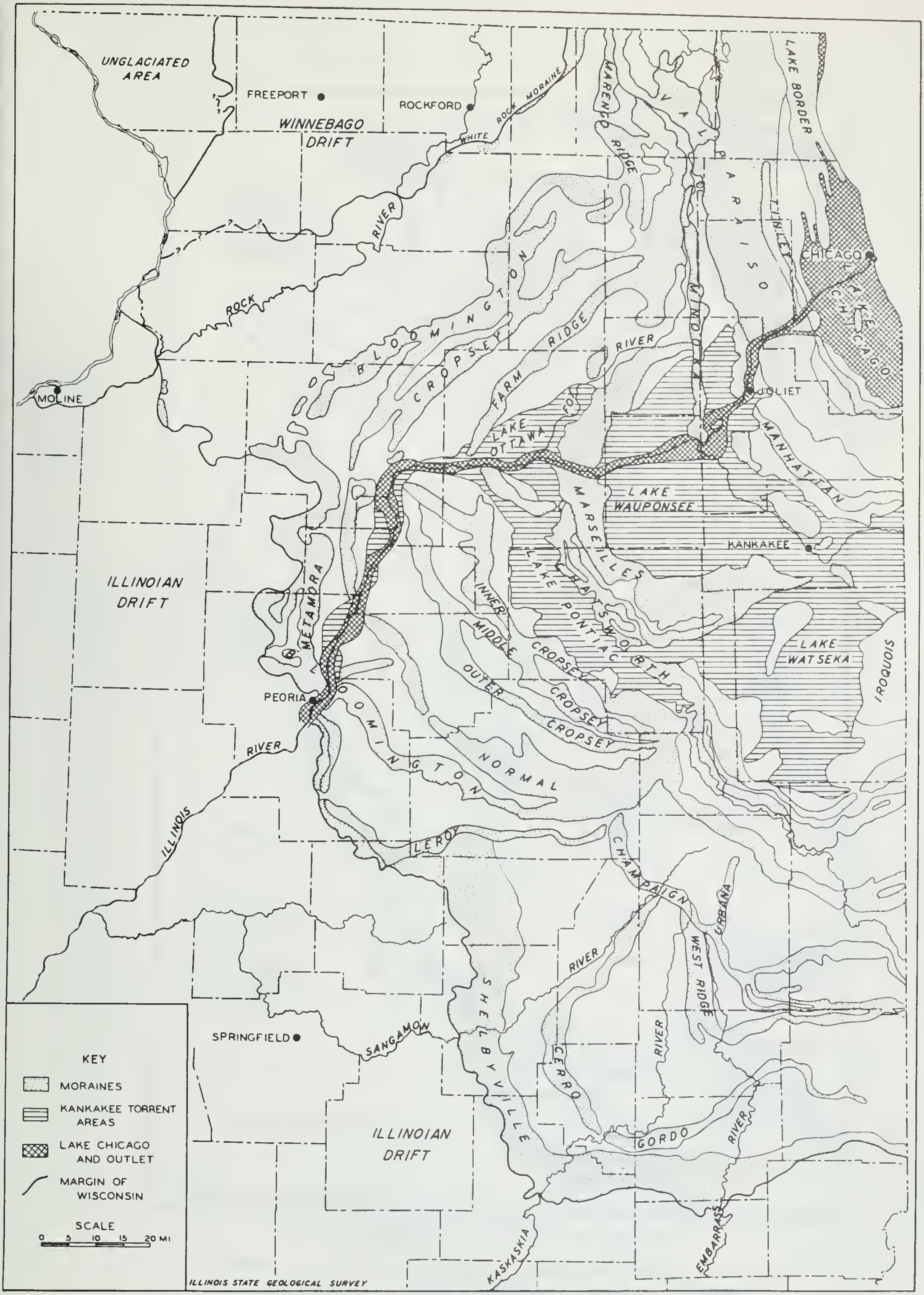
Even the glaciers which halted a long distance from the Port Byron area influenced its geology considerably. When glaciers melt away, they liberate great amounts of water loaded with mud, sand, gravel, and boulders. The earth materials wash down the streams and into the great rivers that flow away from the ice. Such streams as the Mississippi River became choked with sediment which built up the valley floor until the river flowed hundreds of feet above its former level. Winds blowing across the sand and mud flats picked up the dust and sand, deposited the sand as dunes along the sides of the valleys, and deposited the dust as loess over the uplands adjacent to the valleys.

GENERALIZED GEOLOGIC COLUMN FOR PORT BYRON AREA

ERAS		PERIODS	EPOCHS		REMARKS
Cenozoic "Recent life"	Age of Mammals	Quaternary	Pleistocene		Till, loess, and dune sand on uplands; outwash, lake silts and alluvium in river valleys
		Tertiary	Pliocene Miocene Oligocene Eocene Paleocene		Not present in Port Byron area
Mesozoic "Middle life"	Age of Reptiles	Cretaceous			Present only in extreme southern Illinois
		Jurassic			Not present in Illinois
		Triassic			Not present in Illinois
Paleozoic "Ancient life"	Amphibians & Early plants	Permian			Not present in Illinois
		Pennsylvanian			Present in small areas
		Mississippian			Not present in Port Byron area
	Fishes	Devonian			Present in Moline area
	Age of Invertebrates	Silurian	Cayugan		Not present in Port Byron area
			Niagaran	Port Byron Racine Waukesha Joliet	Present in Port Byron area
			Alexandrian		Not exposed in Port Byron area
		Ordovician			Not exposed in Port Byron area
		Cambrian			Not exposed in Port Byron area
Proterozoic Archeozoic		Referred to as	Pre-Cambrian time		No data available

Time Table of Pleistocene Glaciation
(after M. M. Leighton and H. B. Willman, 1950, J. C. Frye and H. B. Willman, 1960)

Stage	Substage	Nature of Deposits	Special features
Recent		Soil, youthful profile of weathering lake and river deposits dunes, peat	
	5,000 yrs.		
Wisconsinan	Valderan	Outwash	Glaciation in northern Illinois
	11,000 yrs.		
	Twocreekan	Peat, alluvium	Ice withdrawal, erosion
	12,500 yrs.		
	Woodfordian	Drift, loess, dunes lake deposits	Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes
	22,000 yrs.		
	Farmdalian	Soil, silt and peat	Ice withdrawal, weathering, and erosion
	28,000 yrs.		
	Altonian	Drift, loess	Glaciation in northern Illinois, valley trains along major rivers, Winnebago drift
	50,000 to 70,000 yrs.		
Sangamonian (3rd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Illinoian (3rd Glacial)	Buffalohartan	Drift	
	Jacksonvillian	Drift	
	Paysonian (terminal)	Drift	
	Lovelandian (Pro-Illinoian)	Loess (in advance of glaciation)	
Yarmouthian (2nd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Kansan (2nd glacial)		Drift Loess	
Aftonian (1st interglacial)		Soil, mature profile of weathering, alluvium, peat	
Nebraskan (1st glacial)		Drift	



GLACIAL MAP OF NORTHEASTERN ILLINOIS

GEORGE E. EKBLAW

Revised 1960

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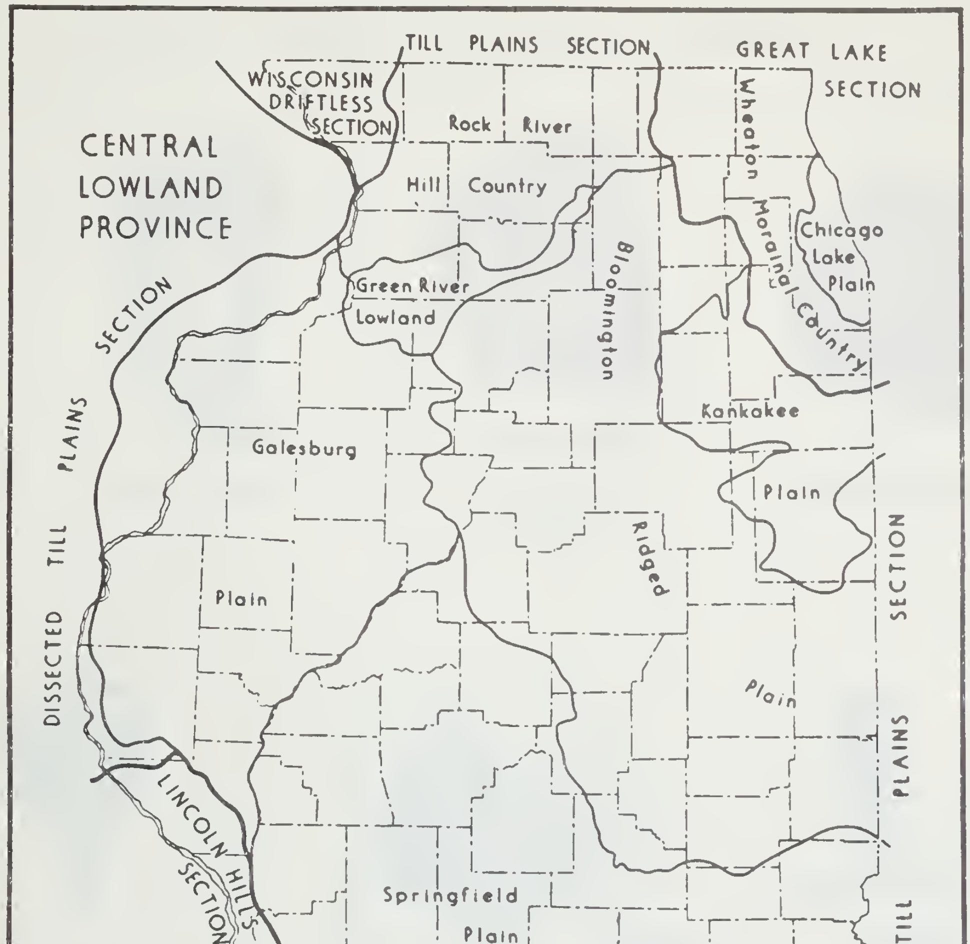

PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

(Reprinted from Illinois State Geological Survey Report of Investigations 129, "Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg)

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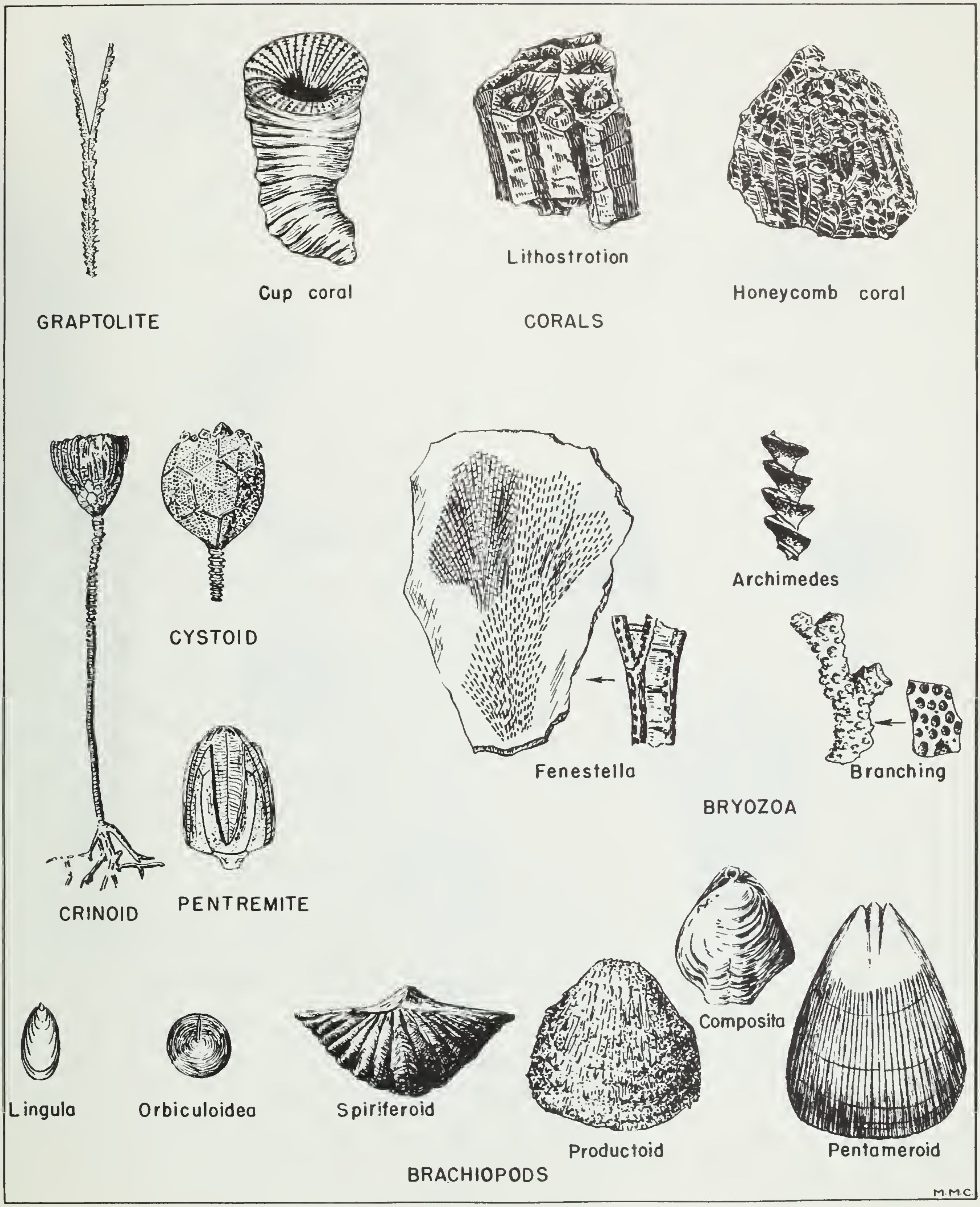
COMMON TYPES of ILLINOIS FOSSILS



COMMON TYPES of ILLINOIS FOSSILS